Technical Study 23
INFORMATICS CASE STUDIES
(Supplementary Material to
"Women and the Chip")
Heather Menzies
July 1981

**LABOUR MARKET DEVELOPMENT TASK FORCE
TECHNICAL STUDIES SERIES**

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ABSTRACT

INFORMATICS CASE STUDIES

Heather Menzies

Informatics is transforming the tertiary or service sector into a professional area of work. It is automating information handling and processing, by transforming information from paper into an electronic form. And it is making that information, plus the automated capability, available as computer aids for more effective management and decision making.

Informatics is increasing the amount and complexity of work in some occupations - generally, at the technical and professional levels. It is decreasing the amount and complexity of work in other occupations -- generally at the clerical and administrative levels. Overall, it is intensifying the skill demands of the labour market, even beyond the capacity of the labour force to meet them. Special adjustment measures may be necessary to help people move from occupations in declining demand to those not only in pressing demand but on which the economy depends in achieving productivity gains.

The purpose of this paper is to shed light on this subject. What is the difference in skills, aptitude and education between those occupations in rising demand and those on the decline? What adjustment mechanisms will be necessary to ensure that people gain access to the growth job areas before they become redundant in the old job areas?

This paper summarizes research into office automation generally and, in particular, into automation in banking. It offers some analysis of the research, followed by conclusions and recommendations.

The information obtained in recent interviews reinforces the general picture that emerged from the case studies in the report, Women and the Chip.

Clerical employment, having increased when informatics was introduced and during a period of overlap between the traditional and the micro-electronic information systems, is now on the decline. It will remain a major source of employment but not of employment growth. Instead, as traditional clerical and administrative work is automated, clerical workers' jobs will be successively "enriched" by the transfer of routine work away from professional workers.

Second, the erosion of work due to the automation of basic processes and procedures is beginning to erode employment at low- and middle-management levels, the very areas to which women have only recently gained access. Traditional administrative work is being automated. Basic supervision is being automated, as is the training aspect of supervisors' work. Chains of command are being shortened as reports are instantly and semi-automatically compiled and updated. Nobody wants to talk about it. But the demise of the administrator and middle manager is a major problem area.

Third, there is a growing mismatch between what the economy needs and what the labour force can supply. While labour force growth over this decade, will depend largely on the increased participation rates of women, labour force demand will increasingly be oriented towards traditionally male-dominated occupations learned in a university setting.

Fourth, companies will exaggerate the gap in skills and aptitude between their clerical-supervisory and other

line-operations personnel and the technical specialists and professionals, if they rely too heavily on outside hirings instead of training for promotion from the inside. This could result in severe occupational discontinuities and severe skills shortages. Equal employment opportunities and affirmative action programs could help break down the barriers to women's occupational mobility. Left in place to be compounded by those associated with part-time work, these barriers could blunt the effect of the best training programs and rigidify a dual labour market. If, however, women could move into the high-demand occupation areas -- taking whatever courses in data processing and computer programming are necessary to upgrade their skills -- they could stave off the skills shortage which otherwise will retard the economy through the 1980s and 1990s.

Finally, pay scales should be adjusted upwards as more senior-level work is shifted into clerical job descriptions. Job titles should also be adjusted to remove attitudinal prejudice. Although a secretary now spends over 50 per cent of her time doing the work of an executive or research assistant, her boss still calls her a secretary and cannot conceive of her moving on to a para-professional or management position. Such a worker by another name, however, might be considered a prime candidate for courses to round out her qualifications for the professional positions that will soon be in demand.

The following are the major recommendations:

(1) A major public education campaign should be launched to alert women to what informatics is doing to traditional clerical and administrative work and to encourage industry to take responsibility for retraining and relocating employees in areas of declining demand.

(2) Existing Manpower training and counselling programs for women should be retailored. Also, alternative training options -- such as on-the-job educational partnerships between government and industry -- should be explored.

(3) Occupational bridging mechanisms and affirmative action agreements should be incorporated with all retraining endeavours for a two-pronged program of occupational mobility for women.

(4) Special tripartite (industry, labour and government) task forces on employment adjustment and informatics for major industry groups should be created.

ÉTUDES DE CAS EN INFORMATIQUE

Heather Menzies

Cette étude vise à examiner plus en détail l'impact de
l'automatisation du traitement et de la manutention de
l'information sur la structure de l'emploi liée au travail de
bureau. On y fait le point sur la recherche effectuée à
l'égard de l'automatisation dans les bureaux en général et
dans les banques en particulier. Après avoir analysé
brièvement les travaux de recherche, on présente des
conclusions et des recommandations.

Les renseignements recueillis à la faveur de récentes
entrevues viennent étayer les conclusions générales qui se
sont dégagées des études de cas présentées dans le rapport
Women and the chip (La femme et la microplaquette).

Après s'être accru suite à l'introduction de
l'informatique sur le marché et durant une période de
chevauchement entre les systèmes traditionnels et les
systèmes d'information micro-électroniques, l'emploi dans le
domaine du travail de bureau est maintenant en train de
régresser. Ce secteur restera certes une source importante
d'emplois, mais non une source de croissance de l'emploi. Au
fur et à mesure que les tâches administratives
traditionnelles s'automatiseront, les postes des travailleurs
de bureau se trouveront progressivement "valorisés" par
l'élimination des tâches routinières que devaient accomplir
les travailleurs professionnels.

Deuxièmement, les effets de l'automatisation de procédés
et de procédures de base commencent à se faire sentir aux
niveaux de gestion inférieurs et intermédiaires, soit aux
niveaux auxquels les femmes n'ont accès que depuis peu.

Troisièmement, il se manifeste un déséquilibre croissant entre les besoins de l'économie et la capacité de la population active à y répondre. Même si, au cours de la présente décennie, la croissance de la population active sera largement attribuable à l'augmentation du taux d'activité des femmes, la demande sera de plus en plus axée sur les professions traditionnellement masculines.

Quatrièment, les entreprises élargiront le fossé, au chapitre des compétences et des aptitudes, entre leurs employés administratifs, leurs superviseurs, les autres employés d'exécution, les spécialistes et les professionnels techniques si elles recrutent en trop grand nombre des employés à l'extérieur plutôt que de favoriser la formation de l'intérieur en vue de l'avancement. Il pourrait s'ensuivre de sérieux écarts d'ordre professionnel et des pénuries aiguës de compétences. Les programmes d'égalité des chances d'accès à l'emploi et d'action positive pourraient contribuer à éliminer les obstacles à la mobilité professionnelle des femmes.

Enfin, les échelles de salaire devraient être ajustées à la hausse au fur et à mesure que les tâches de niveaux plus élevés seront incorporées aux descriptions de postes du travail de bureau. Les titres des postes devraient également être rectifiés pour cesser de véhiculer la vielle mentalité.

Voici les principales recommandations du rapport:

(1) Il faudrait lancer une grande campagne de sensibilisation populaire pour informer les femmes des effets de l'informatique sur les tâches administratives traditionnelles et pour amener l'industrie à assumer la responsabilité de recycler les employés qui exercent des professions où la demande fléchit.

(2) Les programmes actuels de formation de la
main-d'oeuvre et de counselling à l'intention des
femmes devraient être refondus. Il y aurait
également lieu d'examiner d'autres formules de
formation, comme les programmes de formation en
cours d'emploi offerts conjointement par le
gouvernement et l'industrie.

(3) Des mécanismes de transition professionnelles et
des mesures d'action positive devraient être
incorporés à toute activité de recyclage en vue de
la mise sur pied d'un programme à deux volets de
mobilité professionnelle à l'intention des femmes.

(4) Il faudrait créer des groupes d'étude spéciaux
tripartites (industrie, syndicat et gouvernement)
sur l'adaptation à l'emploi et sur l'informatique
pour les grands groupes industriels.

"When looms weave by themselves, man's slavery will end."

Aristotle.

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INTRODUCTION

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Informatics is increasing the amount and complexity of
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intensifying the skill demands of the labour market, even
beyond the capacity of the labour force to meet them.
Special adjustment measures might be necessary to help people
move from occupations in declining demand to those not only
in pressing demand but on which the economy greatly depends
in achieving productivity gains.

The purpose of this paper is to shed light on this
subject. What is the difference in skills, aptitude and
education between those occupations in rising demand and
those on the decline? What adjustment mechanisms -- training
either within the workplace or in institutions, plus
occupational bridging mechanisms such as affirmative action
-- will be necessary to ensure that people gain access to the
growth job areas before they become redundant in the old job
areas?

This paper summarizes my research into office automation generally and, in particular, into automation in banking. It offers some analysis of the research, followed by conclusions and recommendations.

Case studies:

The pattern of information diffusion in industry can be likened to a lump of dye being tossed into a basin of clear water. At first, the new technology (the dye) was separate from the rest of industrial activity. Data processing was added on as a new department in most companies, with its employees hired from the outside and generally regarded as aliens by the others. Slowly, though, the expertise, capacity vocabulary, and even personalities associated with data processing infiltrated other departments' operations. Now, the lump of dye has all but dissolved into a generalized new way of handling all information needs in a company. Informatics permeates every aspect of business activity, and is transforming the entire character of doing business. Consistent with that change, data processing departments of the 1970s are now being renamed information systems and management information systems departments.

CASE STUDY I
A LARGE CORPORATE OFFICE

In the first case studied in Women and the Chip (1),
data processing was introduced to a large multi-faceted
Canadian company as a means of handling its burgeoning
information reporting and processing demands. Having
increasingly large files of electronic information (data
banks) to draw on, plus an increasingly large teleprocessing
network across which to spread costs, the department was able
to expand its vision beyond simple record keeping into areas
more traditionally associated with office information and
administration work. A possible struggle for leadership in
introducing informatics throughout the company was deflected
into an interdepartmental study from which a 10-year master
plan for implementing informatics throughout the entire
company was drafted.

The study had found, for instance, that 70 per cent of
outgoing mail and 55 per cent of incoming mail was destined
for or generated from within the corporate network, and could
therefore be almost immediately handled as electronic memos
and messages. As candidates for electronic files, it found
53 million sheets of paper on file, increasing at roughly 9
per cent a year and requiring several person-years to
maintain.

The master plan itself goes well beyond electronic
information processing, filing and distribution. It includes
a corporate telecommunications grid, interactive reporting,
remote and personal computing, facsimile document and graphic
transmission, electronic messages, memos and mail, electronic
calendars and access to various corporate data bases.

The first major informatics transformation involved the
Informations Systems Department. The top 50 executive-

professionals have their own desk-top terminals, on which
they now type out and receive up to 50 per cent of what they
used to have secretaries handle in the past. Now, only two
of the top 50 have their own secretary, a job which resembles
that of administrative or research assistant more than it
resembles the traditional job of secretary, since automation
has shrunk traditional secretarial work into a small fraction
of the day's work.

The second major informatics innovation linked some of
the line operations personnel with senior vice-presidents'
offices. The third project, scheduled for this spring, will
see the Human Resources Department enter paperless offices
currently being set up by experts in Information Systems.

Employment Effects

One of the most profound, and telling, changes to date,
has occurred in the former data processing department, the
Department of Information Systems. Between 1972 and 1980,
the department witnessed a complete reversal in the ratio of
clerical-support information workers to professional
information workers (see Figure 1). The mix changed from 80
per cent clerical and 20 per cent professional to 45 per cent
clerical and 55 per cent professional. Most significant in
the change is the fact that of the 130 workers displaced from
the clerical ranks, only two moved up to the professional
ranks.

This bears out the finding of a 1978 study, done for the
Department of Industry, Trade and Commerce (2), of skill
requirements resulting from new technology. The study
predicted that technological changes would increasingly
require that workers possess technical knowledge above and
beyond those skills that can be acquired relatively quickly
and through on-the-job training. In other words, without
additional education and training, occupational continuity
could be stymied, lateral transfer options could become

exhausted as low-skilled job opportunities dry up, and
unemployment due to occupational discontinuity could result.

1972

1980

78%
clerical
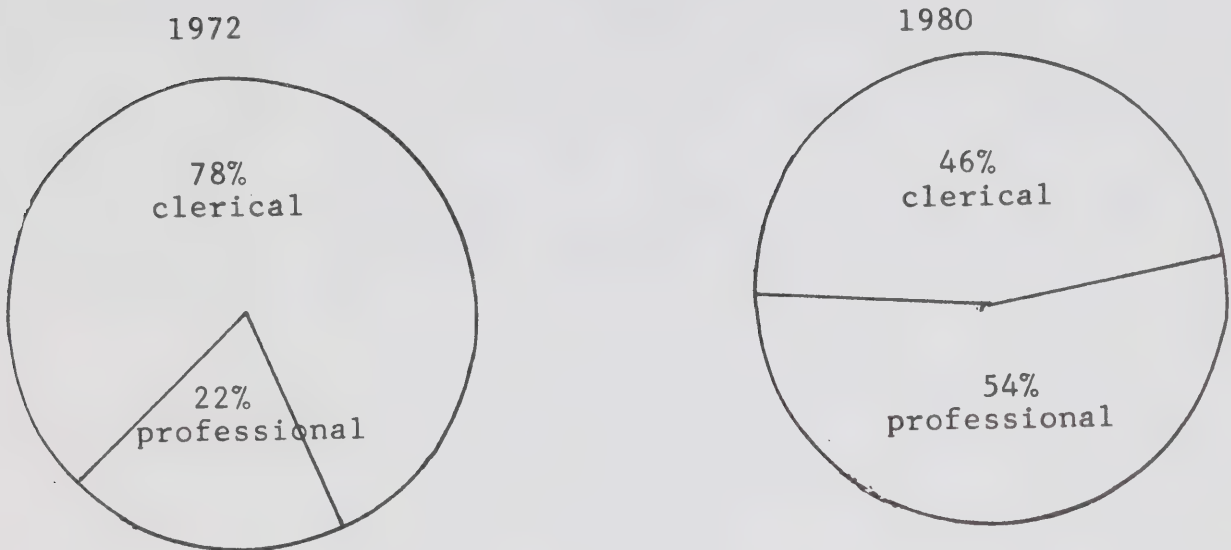
22%
professional

46%
clerical

54%
professional

FIGURE 1: CLERICAL AND PROFESSIONAL EMPLOYMENT IN INFORMATION
SYSTEMS DEPARTMENT OF A LARGE CORPORATION, 1972 and
1980

Although in an extreme form, the department represents
the general trend of informatics-related change occuring
throughout the company. Clerical people are being replaced
by professionals in computer science, engineering and
business administration, and the difference in skills,
education and aptitude represents what one personnel officer
describes as a "quantum leap" in schooling, experience and
aptitude.

The clerical workers of the 1960s and early 1970s were doing the same kind of work as they or their parents did before the first wave of mechanization and automation. While earlier they moved materials around, more recently they moved information about those materials around. The work still involved basic processes and procedures. With informatics, those processes and procedures are being automated and computerized.

This occured first in the Information Systems Department. When data processing was introduced, a lot of process and procedure people were needed: keypunch operators to put information into the computer system; computer operators to load and unload tapes, and so on. But as the automated information system reached maturity -- with a core of information already in electronic form and optical scanners absorbing a lot of the work that data encoders and keypunch operators used to do, as well as with sophisticated programs for remote processing and handling of information -- there was less work for clerical workers and more work for people who could apply the automatically synthesized information in new ways as well as apply the informatics technology to new corporate objectives.

As an example of the latter, professionals in computer programming and systems design are developing the facilities and system that the Human Resources Department will use when it enters the electronic office this spring.

Departments with a longer history and a more diversified range of activities, such as Human Resources, can be expected to change more slowly and less dramatically; however, the dynamics of the quantum leap in skills demand can still be seen. For instance, in the Human Resources Department

nearly all the professional-management level openings over the past five years have been filled from former clerical and other line-operations personnel who rose through the supervisory ranks, now computer scientists, industrial psychologists and other specialists hired from the outside command nearly all the personnel job openings.

In part this reflects the maturing of such professions as personnel administration. In part, too, the computer has made this maturing possible. Computer modelling and complex statistical analyses via computer make possible more professionalism.

The effect, though, is unmistakeable. By hiring from the outside instead of from clerical and related line-operations ranks as before, the company is replacing occupational continuity with at least the potential for discontinuity. By slotting the most schooled professionals into the senior ranks, the company is widening the skills gap between these and the lower ranks, and possibly even institutionalizing a dual labour market within the company. There is a strong indication of this in the dual job-filling pattern that has developed over the past decade. Whereas all job openings were filled from within the company, now 75 per cent of the head office (corporate) jobs are filled by outside hirings. Ninety per cent of the line-operations openings are still filled internally; however, since there is only 25 per cent continuity potential between the most senior administrative-supervisory position and the senior corporate positions, there is an effective (and somewhat low) ceiling imposed on occupational mobility from clerical and other procedure-process occupations.

Meanwhile, armed with informatics tools and keys to data banks, personnel department professionals will exaccerbate occupational discontinuity by tackling analytical tasks undreamed of before. For instance, checking to see if the mortality rate of its employees differs from the national average. It could also project cash flows from pensions 20 and 30 years hence. "The ability to do this generates the requirement that you do this," the personnel official notes. In other words, these professionals will carry forward productivity targets; however, the less productive could be left so far behind that if would seem counter-productive to try to help them later.

There is still a place for the clerical worker who handles address changes for pensioners. However, there is less clerical work to be done in each aspect of running the company. For instance, the address change has to be made only once and it is instantly available throughout the company's information system and can be produced automatically on any list or envelope.

Figure 2 represents the view of employment change from the manager of Information Systems, who argues that mass employment in the traditional industrial sense is becoming redundant. "In the automated world, there isn't that much work to be done," he says. Within the working group, he identifies essentially four occupational groupings:

- equipment operators: this would include typists, word processor operators, keypunch operators and data encoders;

- maintenance personnel: including operators of computers as well as upkeep and repair staff;

- "paper shufflers": supervisory and administrative personnel responsible for generating information and applying procedures;

- specialists: this group would include technicians, computer operators and other skilled people.

He predicts a decline in employment in three of the four occupational groupings: only specialists will be in demand.
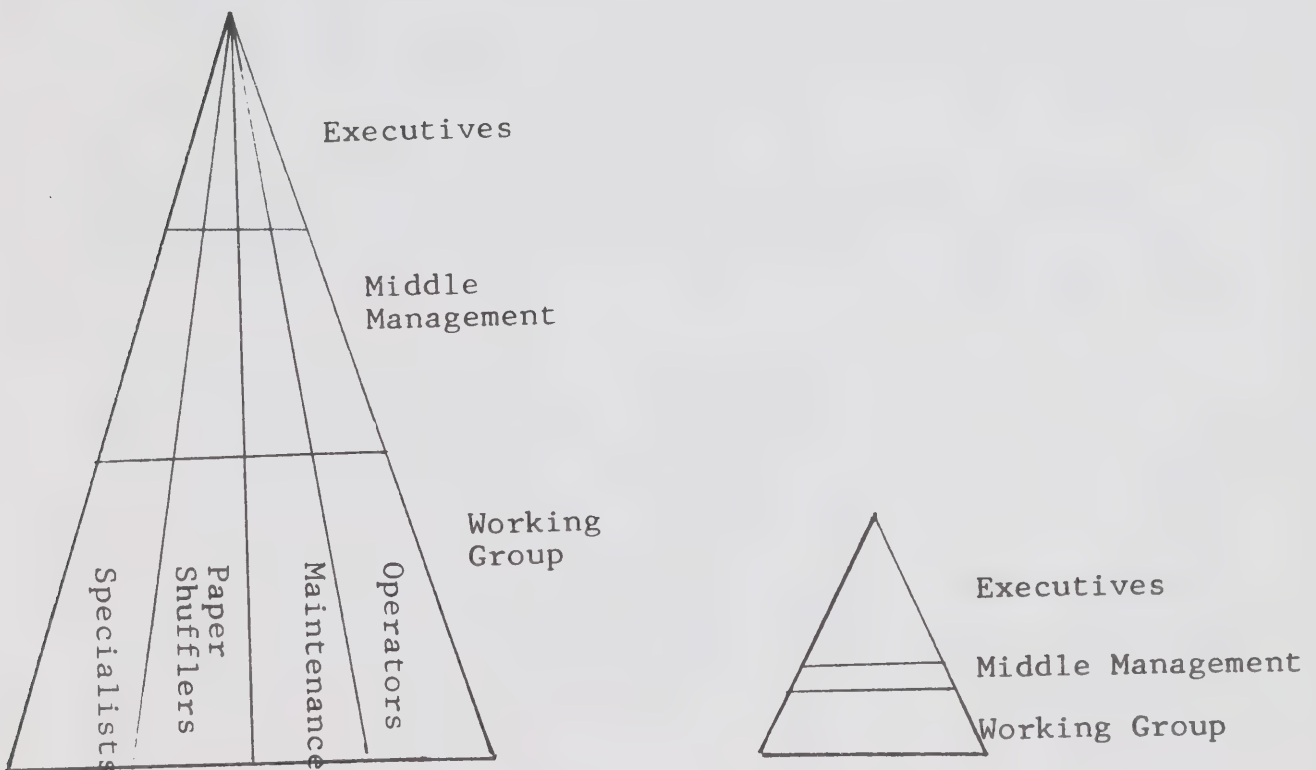

FIGURE 2: ILLUSTRATION OF EMPLOYMENT SHIFTS OVER TIME, AS DRAWN BY THE MANAGER OF INFORMATION SYSTEMS (hypothetical)

Furthermore, he foresees a substantial shrinkage in middle-management ranks as the procedures and processes that form the backbone of administration are automated and the task of management is transformed from getting things done to knowing what to do next. This is one of the least-discussed aspects of informatics transformation in large companies. As professionals are replacing company men and women in the senior ranks, traditional middle management is being eclipsed. Not surprisingly, middle management has made what could best be described as an attempt to sabotage the second informatics project - namely the collapsed chain of reporting command between the line operations and the vice-presidents. They're trying to postpone their redundancy.

Overall, though, there will be a shrinkage, resulting in a much smaller personnel pyramid (potentially a third of the size) than before.

The company anticipates a 2 per cent compounded annual growth rate in the professional-management ranks through the 1980s. It expects 1 per cent per annum compounded growth to occur as outright additions and a further 1 per cent compounded growth to occur as replacement for clerical employees. Most of these positions will be highly skilled professionals and technical specialists rather than general managers.

As an indication of the shifting emphasis towards professional and specialist-technical occupations, there has been a sharp increase in average salary grade within the company over the past five years, and the trend is expected to continue through the decade.

Certainly, market competition for professionals has caused some of the upward shift. But even after discounting for this factor, the personnel official says, "there's a pretty powerful change" occurring in the company's overall skills profile.

It's worth noting that professionals and specialists are expected to "replace" clerical workers. The personnel official later expressed this transformation in terms of clerical work becoming "enriched" to the specialist-professional level, but only later. Such differences in perspective are as significant as the facts, for the perspectives of today will influence the facts of five years hence. For instance, given adequate training and occupational mobility opportunities, a clerical worker could, in five years, move into the expanding specialist ranks.

Right now, though, the company expects to "buy" the necessary talent. Regarding the clerical workers, "they'll be sent off to wherever redundant clerks go. I don't know. Unfortunately, that will be women. (But) it's a question of social responsibility versus running a company. We may hold jobs empty for six months rather than lay someone off. If you have a five-year time horizon, you can do anything."

The example of this company suggests that the government could be faced with a major retraining and re-education job. Yet the major talents in demand in the paperless office of

the future don't come entirely from a textbook or training
program.   They include human-relations and communications
skills and conceptualization ability -- for instance, to
exploit the full resources of a computer.

Part of the problem might be that the definition of a
clerical worker includes a strong attitudinal assumption.
For instance, the personnel official defined clerical worker
as follows: "a clerical worker wants to expend the minimum
of energy for the maximum price."

CASE STUDY II

A BANK

Until automated teller machines began to be installed,
major informatics innovations in Canadian banks took place
largely unnoticed by policy makers and the general public.
As in the previous case discussed, informatics actually began
with the installation of a computer and of a data-processing
department. Over time, more information was transformed into
an electronic form, and more banking operations were
integrated into the computer-based system.

In the second phase of banking automation, computer
facilities made it possible for the banks to do more, and
this increased employment. In fact, the increase in services
that was made possible by informatics technology is credited
with substantial employment gains during the 1970s. However,
towards the latter half of the decade, informatics had
reached a maturity marked by a slow decline in clerical
employment even as technical-professional employment
continued to rise. For instance, daily interest savings
accounts, a new service made possible by on-line computer
power, added substantially to the workload of accountants and
computer specialists but contributed relatively little to the
workload of clerical workers.

In fact, the clerical work content of banking
transactions was reduced and the number of clerical job
functions telescoped. For instance, on-line banking not only
saves the teller from the after-hours work of preparing daily
transaction records for the bank's data centre, it also
allows her to enter the transaction details directly into the
data centre's computer. The teller thereby absorbs the data

entry clerk's job function to fill out her spare time. Now,
automated teller machines are taking the teller clerical
labour content out of basic banking services - services that
account for 85 per cent of banks' business. The scales have
tipped, away from clerical work towards professional bank
employment.

The on-line capacity and computer-communications
infrastructure that big banks now have is unleashing the
tremendous potential that exists for professionalizing bank
services. It is also fuelling demand for the type of
professionals required to develop the sophisticated services
that on-line computer power makes possible. Two examples of
new directions will be discussed: extending self-serve
banking from consumers to other bank customers, such as
corporate accounts, and expanding the scope of on-line
capacity to include such features as word and text
processing.

Traditionally, a corporate account manager was
responsible for monitoring a client-company's financial
dealings. Recently, though, this bank has transferred this
work (this information power actually) to the customer by
installing a computer terminal directly on the desk of the
company's comptroller. Now, for instance, the comptroller
for MacDonald's Hamburgers can monitor the accounts of all
the outlets in the chain by calling up the balances on his
own terminal screen. The corporate account manager who used
to supply that information must now take on the more
challenging work of interpretting and analysing multiple
financial transactions with multiple interest factors, using

and writing sophisticated computer programs as financial-planning and consulting aids.

Similarly, account managers for payroll processing will soon require computer-modelling skills as well as knowledge of banking and personnel policies, whereas before they merely had to master various procedures.

As banking becomes more of a self-serve business, with the procedures that bank personnel used to execute being incorporated into computer programs, banks are ceasing to be places where an individual can rise Horatio (or Lucretia) Alger style through the ranks of experience to senior management.

In another area of innovation, the bank is currently extending its information-processing system out from the basic word-processing units. In the first step, word-processing units are being linked to the on-line computer-communications grid that has existed throughout the branch banking network since the late 1970s. In the second step, 50 additional terminals are being added, directly on the desks of corporate executives and professionals. What was a separate enterprise in word processing – first used to handle mass mailings for credit card holders – is now being moved like a piece in a jigsaw puzzle to fit into the bank's overall informatics transformation. Figure 3 shows the development of the office-automation word-processing system, with the dotted line indicating the current stage of implementation.

```
┌─────────────────────────────────────────────────────────┐
│  bank-wide applications    ◄──    principal support      │
│                            ◄──                           │
│  divisional applications   ◄──    electronic filing      │
└─────────────────────────────────────────────────────────┘
                            ▲
              ┌──────────────────────────────┐
              │         electronic           │
              │           mail               │
              └──────────────────────────────┘
                            ▲
              ┌──────────────────────────────┐
              │      unit applications        │
              │       administrative          │
              │       effectiveness           │
              └──────────────────────────────┘
                            ▲
              ┌──────────────────────────────┐
              │     word processors:          │
              │        secretarial            │
              │         efficiency            │
              └──────────────────────────────┘
```
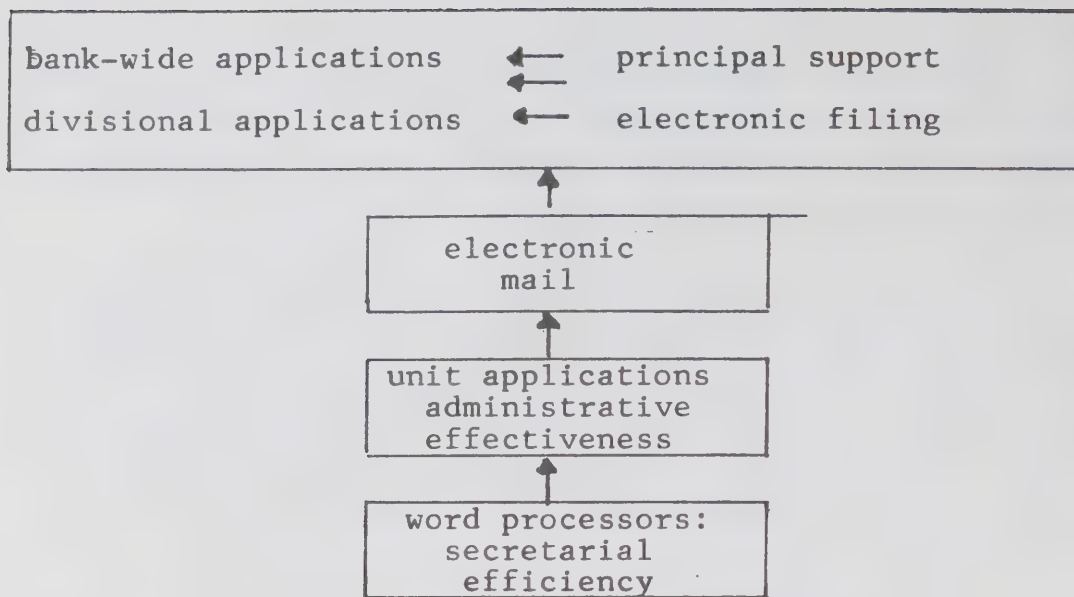
FIGURE 3:   STAGES IN IMPLEMENTATION OF OFFICE AUTOMATION.

When the system is fully installed, the mutual benefits will be enormous, with word processing enhancing the provision of automated data services to corporate and other bank customers, and with access to data and the communications grid enhancing the application of word-processing services.

By 1990 the system should be sufficiently integrated that someone needing to correspond with a multi-national corporate client will merely enter a few key words into the system to call up relevant sentences from all previous correspondence and background data on financial dealings.

It is a step-by-step transformation, with individual
department users exploring, discovering and, in turn,
extending the potential of the system. Once the terminal is
on a department manager's desk, it is expected that the
manager himself or herself will speed the further extension
of the system. This suggests an ever faster diffusion of the
technology throughout the bank, especially as further
applications will produce ever-broader benefits for
ever-smaller unit costs.

Employment Effects

The employment effects to date can be summarized as
follows:

- declining clerical labour demand;

- increasing demand in technical and professional
  occupations;

- intensification of work at the professional level and
  a deskilling of work at the clerical level, producing
  an ever-widening skills and aptitude disparity between
  the two occupational groups.

The reduction in clerical work has been seen to take
several forms:

- a truncation in clerical steps involved in financial
  transactions;

- a transfer of clerical work into the customer's hands;

- automation of clerical steps and procedures.

The changes currently being introduced will extend the scope and multiply the effect of these reductions. For instance, as terminals are installed on corporate customers' desks, much of the clerical work associated with managing corporate accounts will be removed -- at least from the bank's premises and payroll. Similarly, as the word-processing system is integrated with the bank's main computer-communications system, the clerical-research work associated with searching for and through files will be eliminated as the system responds automatically to key words typed into the system.

Clerical employment, then, can be expected to continue its gradual decline, although it will continue to constitute the bulk of bank employment.

The nature of clerical employment will also change dramatically, aided by banks' traditional high turnover rate and abetted by the bank's intent to increase its part-time employment, up to 50 per cent of non-management, according to one personnel official. Through these mechanisms, the bank hopes to raise the entry-level of skills and aptitude from what is currently labelled clerical to what is currently considered "para-professional." Computer- terminal experience is becoming essential for bank employment. Other emerging prerequisites include mathematical skills, good interviewing and other human relations skills and a certain measure of initiative. The teller or customer service representative of the future will be expected to track a customer's complaint and correct the problem. The work is equivalent to what a senior supervisor used to do.

Table 1 indicates that a fairly dramatic shift in the bank's employment profile has already taken place. Throughout the bank's total operations, employment in the managerial-professional ranks increased by 26 per cent between 1975 and 1980, while clerical employment actually dropped by 300 people. The same pattern was apparent on the domestic side, with clerical employment having dropped by nearly 5 per cent while management-professional employment rose by 15 per cent.

Table 1

BANK EMPLOYMENT, BY OCCUPATION, 1975 and 1980

Occupation		Total Operations	Domestic Operations
Management-	1975	6 424	4 377
Professional	1980	8 066	5 040
Clerical	1975	17 895	14 709
	1980	17 582	14 100

While the bank's employment profile is still basically pyramid in shape, the hirings profile is tubular in shape. It is also significant that as a result of heavy professional-technical level hirings, by 1980, the management-professional group accounted for just over 30 per cent of the bank's total employment, compared with just over 25 per cent in 1975.

It is also significant that the bank's overall employment level was relatively flat over the 1975-1980 period, while the bank's asset base increased by 300 per cent.

This means that while the bank is increasing its role in the country's economy, it is not increasing its role as an employer. The bank seems to have entered a state of jobless economic growth, increasing the quality of its employment at the expense of numbers employed.

Another significant change is that occupational mobility is increasingly being thwarted by external hirings. Traditionally, the bank filled its management positions through upward mobility, relying almost exclusively on the branch-administration officer position as the source of fresh management material. The position still is the stepping stone from clerical and supervisory work into management. However, fewer people from the bank's clerical ranks fill this position, as over 50 per cent of senior positions are now filled by professional and technical specialists hired from outside the bank. This reflects the reduced emphasis on bank procedures and the increased demand for sophisticated expertise.

It also means that the door to upward mobility on which over two-thirds of the bank's female employees depend is being opened only half as often as it used to be. At the best of times women's concentration below the rank of branch administration officer, and reliance on that one position as their entrée to more challenging work, was a serious frustration to career ambitions. With that career access point now halved in access effectiveness, some alternative mobility mechanisms are necessary. (*) Not only is clerical employment clearly decreasing, but the demand for professional and specialist personnel is clearly increasing,

(*) For a brief discussion of initiatives for equal opportunities for women taken by one bank in Canada, see Appendix.

and will not be met by relying exclusively on fresh
university and college graduates. As David Dodge pointed out
in a speech to the Conference Board of Canada last November,
labour force growth during the 1980s will derive largely from
increased participation rates of women, women who are already
in the workforce and are between the ages of 25 and 55.

SUMMARY AND CONCLUSIONS

The service sector is coming of age on the wings of computer-communications technology which, in turn, is helping to shape and vastly accelerate the maturing process. By investing in informatics technology, the sector is becoming more capital intensive and less labour intensive, with the equipment increasing the productivity of clerical and administrative work through automation and intensifying the capacity for professional and specialist work through computer aids.

It would be useful to know exactly how fast the technology is being diffused through the service sector. It would be useful to know how much skill packages are being changed, and how fast this change is occurring.

Despite the data-firm impression conveyed by the predictions included in Table 2 and Figure 4, the diffusion rate remains a subject of conjecture. For instance, it is worth recalling that forecasters were humiliated in the 1960s when history disproved their dire predictions of mass unemployment as the first wave of automation was diffused; reluctant to be twice fools, these forecasters are now more conservative in their predictions. Second, predictions for the diffusion of office-of-the-future capacity, based on equipment sales, are necessarily conservative because they ignore the multiplier effect of computer terminals being used as word-processing units and visa versa. Third, resistance to change as well as skill shortages will slow the diffusion process. Regarding shortages, it is estimated that there are eight data processing jobs for every available data processing graduate.

Table 2

ESTIMATES OF OFFICE AUTOMATION EQUIPMENT. 1978-1985

Item	Number of Units, 1978	Preliminary Forecasts for 1985
Business Telephones	4 500 000	6 000 000
Office Typewriters	800 000	960 000
Word Processors		
Non-communicating	18 000	65 000*
Communicating	1 000	10 000
Computers	18 000	150 000
Data Terminals	250 000	700 000
Telex, TWX and other Message Terminals	56 000	70 000
Facsimile Terminals	8 000	28 000
Photocopy Machines	300 000	450 000

* Note: This 1985 estimate appears unduly conservative. A
   total for word processors of both types of 80,000-85,000
   would apper more consistent with estimates for earlier
   years.

   Source: R.W. Hough & Associates Ltd. Office Automation
   Equipment: The Present Base and Future Prospects to 1985,
   prepared for Communications Economics Branch, Department
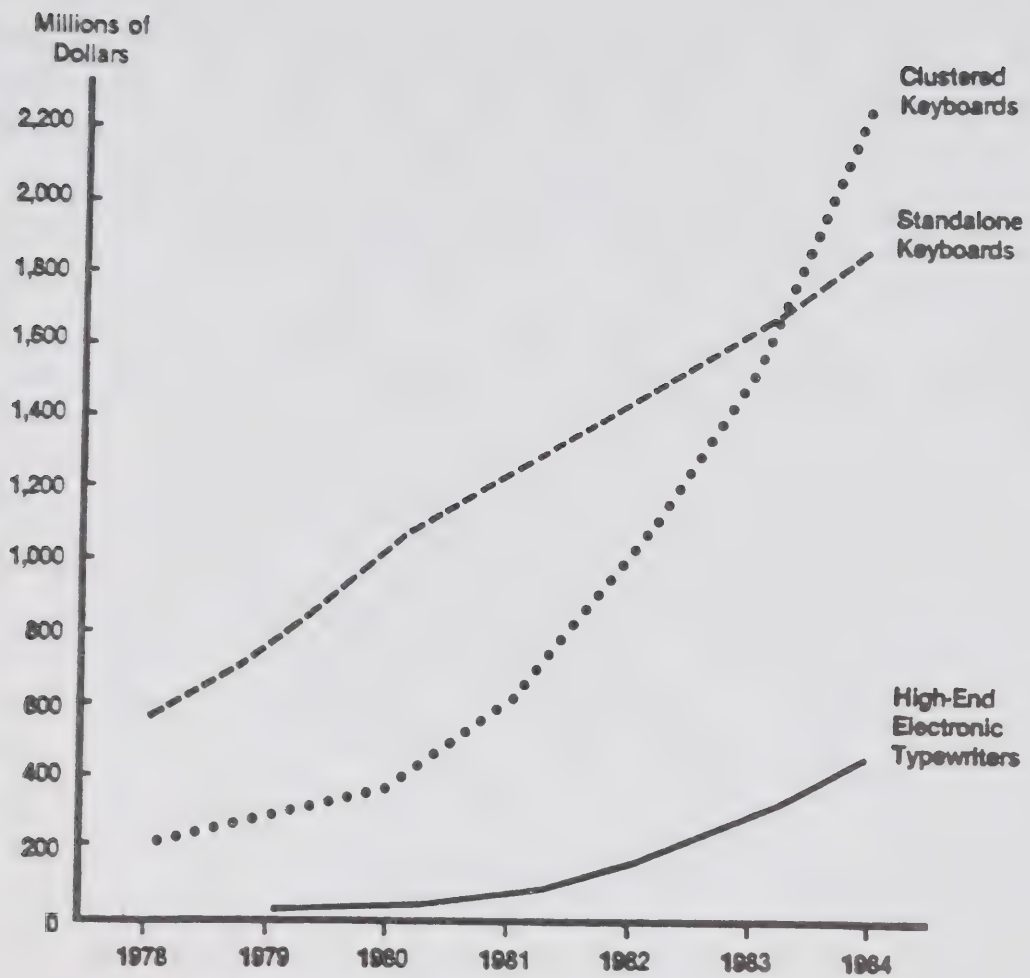   of Communications, August 1980.

FIGURE 4: IDC FORECAST OF WORD-PROCESSING KEYBROAD
SHIPMENTS, U.S. IN U.S. DOLLARS, 1978-1984.

The author's personal view is that the office of the future could be substantially entrenched in Canadian business by 1995, with the take-off point into rapid diffusion occuring in the latter half of the 1980s. The major banks and a handful of major businesses that are on the leading edge of informatics change are targetting for a fairly integrated state of informatics implementation by 1990. By then, it is possible that other large companies and even some medium-sized companies will be only five years behind them. They will use the package computer-communications services currently being developed for market as a means of catching up.

By the late 1980s, the change in skill profiles now occurring in the leading-edge companies will have reached multiple magnitude proportions. As previously discussed, there seems to be a rising demand for and an increasing sophistication in professional occupations. There seems to be a diminishing (at least relative) demand for and skill content of clerical and administrative occupations. Third, there seems to be a growing skills, aptitude and education disparity between the two occupational groupings, raising serious concerns about occupational discontinuities with resultant unemployment and/or institutionalized separate labour markets. It is important to distinguish, however, between actual skill needs and proficiencies and perceived needs and proficiencies.

Certainly the demand for professionals and technical specialists is increasing. At one bank, for instance, there are 100 M.B.A. graduates on staff, compared to five 10 years ago. At the same bank, an entry-level technician today has two degrees, whereas 10 years ago only a little technical knowledge was required. There are similar examples of

substantial increases in skill requirements. What is not clear, however, is the degree to which the availability of a university-educated person creates the demand for such persons. On the other hand, the presence of a few highly competent Ph.D. graduates might raise the performance/ productivity standard for others, thereby turning the high-skill demand (and degree bias) into a self-fulfilling prophecy.

Some specific skills were identified as needed: data processing, computer programming and computer modelling, plus typing and related terminal and computer-use skills. Equally important in the eyes of all industry officials interviewed in this study were a number of personal skills: communications and interviewing skills, human relations skills and good salesmanship and public relations skills. As well, a number of aptitudes or attitudes were identified as equally if not more important. These included self-reliance and personal initiative, as well as flexibility to not only acquire new skills and take on new challenges but also to shift roles from, say, project team member to subordinate to interventionist-initiator.

Although some of these skills/traits require extensive study, taken together, they don't suggest the kind of "quantum leap" difference in skills and abilities envisioned by some industry officials. This quantum leap vision, though, could contribute to a self-fulfilling prophecy. If clerical workers aren't even considered for relocation into some of the occupation areas in demand, the continuing dependence on outside hirings of highly educated professionals could rigidify the already existing dual labour market.

Comments from recent interviews lend weight to this possibility. For instance, the bank could easily introduce shift work once it has 50 per cent of its non-management employees working on a part-time basis. Besides being cut off from normal workday routines of the bank, such workers would also be isolated from fellow bank employees, as they work in central data centres or on terminals in their homes. As well, one bank official referred to two career ladders in the bank, one for men and a separate one for women. This conception stems from the traditional concentration of female bank employees in a handful of jobs in bank branches, virtually all of them below the level of branch administration officer. Women are beginning to penetrate many other areas of bank employment; however, the dual labour market perspective is not helping. Also, the increased reliance on professionals hired from outside the clerical and professional occupations institutionalizes a low ceiling to occupational mobility for clerical workers. If left to continue, it is not unrealistic to predict the kind of unjust scenario that Kurt Vonnegut describes in Player Piano, one with an elite of management, professional and technical workers on one side, an army of deskilled clerical workers on the other, and between them a tense, hostile distance represented by an unbridgeable skills gap.

Interestingly, when I asked for reaction to the hypothetical skills profile of the labour force of the future depicted in Figure 5, there was general agreement on this as a likely development. Both items of information should be taken into consideration as policy-makers grapple with the issues involved in the employment impact of informatics.
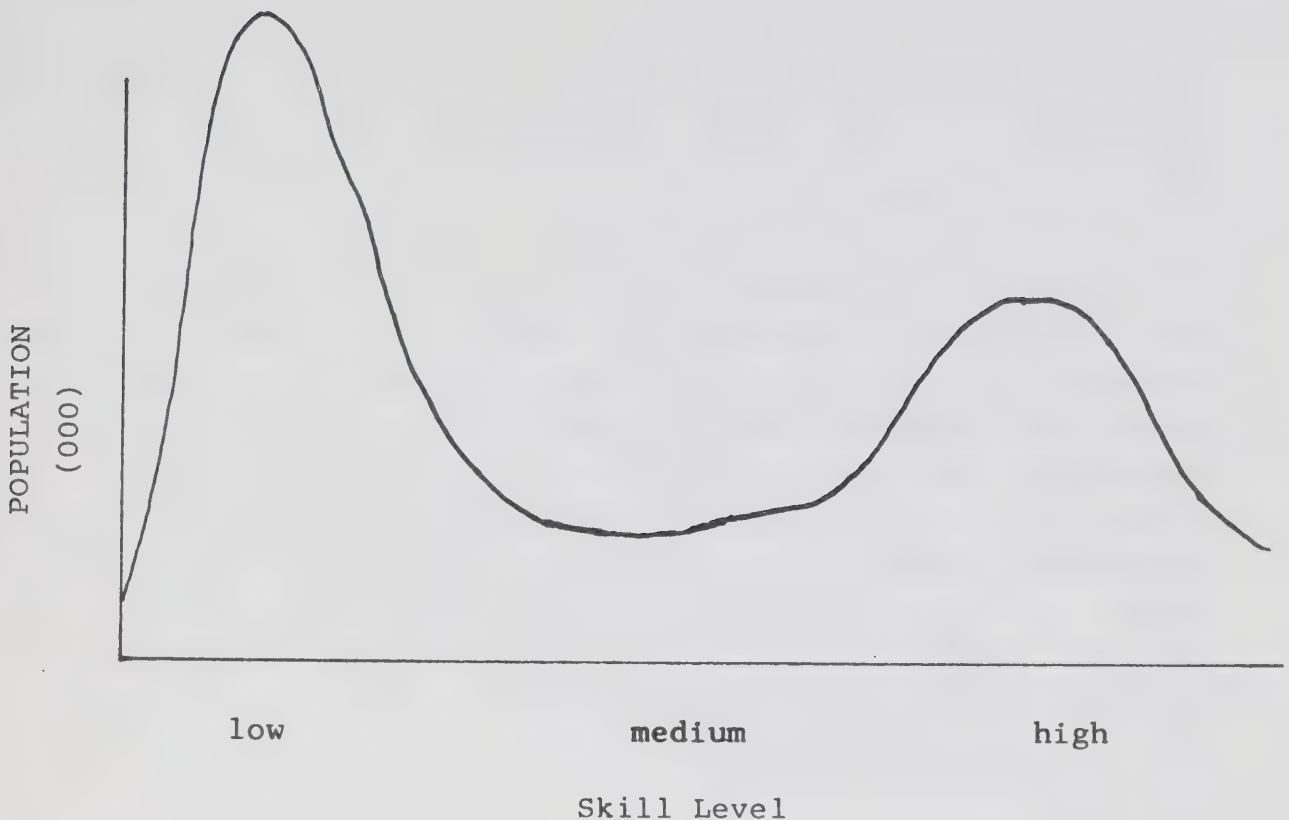
FIGURE 5: LABOUR FORCE DISTRIBUTION, BY SKILL
LEVEL, 2001 (hypothetical)

In summary, then, the information obtained in recent
interviews confirms the general picture which emerged from
the case studies in the original study, Women and the Chip.

Clerical employment, after having increased when
informatics was introduced and during a period of overlap
between the traditional and the micro-electronic information
systems, is now on the decline. It will remain as a major
source of employment, but not of employment growth. Instead,
as traditional clerical and administrative work is automated,

clerical workers' jobs will be successively "enriched" with
the transfer of routine work away from professional workers
-- such as loans officers who spend an estimated one-third of
their time on clerical work and another one-third on
low-level management.

Second, the erosion of work due to the automation of
basic processes and procedures is beginning to erode
employment at low and middle-management levels, the very
areas to which women have only recently gained access.
Traditional administration work is being automated. Basic
supervision is being automated, as is the training aspect of
supervisors' work. Chains of command are being shortened as
reports are instantly and semi-automatically compiled and
updated. Nobody wants to talk about it. But the demise of
the administrator and middle manager is a major problem area
and needs special attention.

Third, there is a growing mismatch between what the
economy needs and what the labour force can supply. While
labour force growth will depend largely on the increased
participation rates of working age women over this decade,
labour force demand will increasingly be oriented towards
traditionally male-dominated occupations learned in a
university setting. Figure 6 illustrates the disparity which
this could represent. The shaded portions on either side
would represent redundant workers either within the workplace
in the form of low productivity -- or as the unemployed. The
shaded portion at the top represents economic opportunities
lost for the lack of adequately trained poeple to meet the
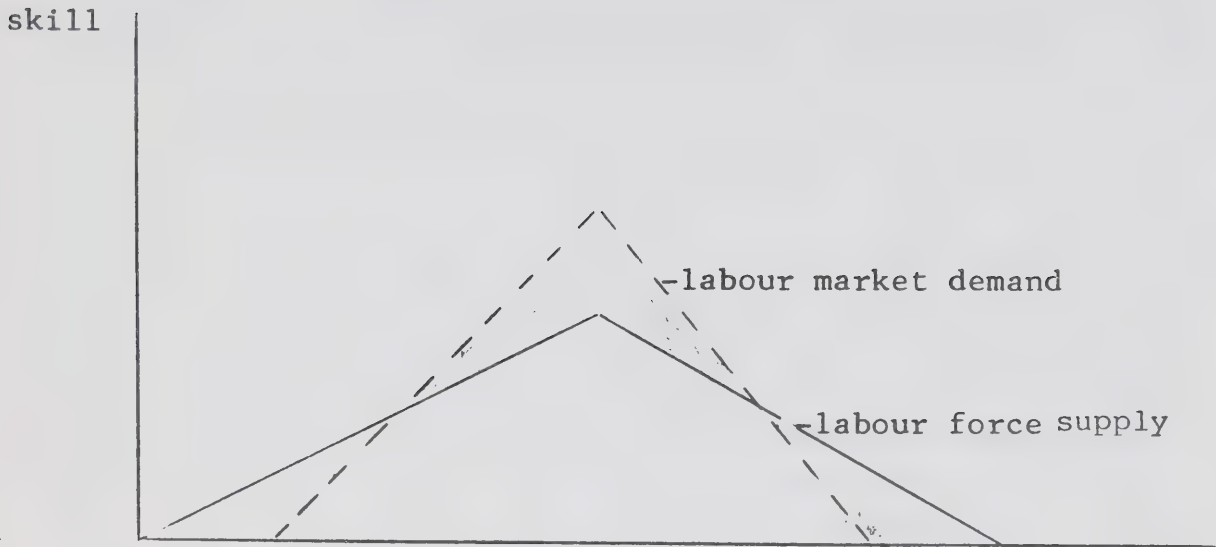skills demand.

skill

FIGURE 6:   POTENTIAL MISMATCH BETWEEN FUTURE LABOUR FORCE
            SUPPLY AND LABOUR MARKET DEMAND (hypothetical)

Fourth, companies will exaggerate the skills and
aptitude gap between their clerical-supervisory and other
line-operations personnel on the one hand and, on the other,
the technical specialists and professionals, if they rely too
heavily on outside hirings instead of training for promotion
from the inside. This could result in severe occupational
discontinuities on the one hand and, on the other, severe
skills shortages which could jeopardize economic growth in
Canada. Equal employment opportunities and affirmative
action programs could help break down the barriers to women's
occupational mobility. Left in place to be compounded by the

barriers associated with part-time work, these barriers could blunt the effect of the best training programs and rigidify a dual labour market. If, however, women could move into the high-demand occupation areas - taking whatever courses in data processing and computer programming they needed to upgrade their skills -- they could stave off the skills shortage which otherwise will retard the economy through the 1980s and 1990s.

Finally, the "enriching" of clerical jobs envisaged by the transfer of clerical-type functions from more senior jobs raises concerns regarding equal pay for work of equal value. It is important that pay scales be adjusted upward as the more senior-level work functions are shifted into clerical job descriptions. It might also be worthwhile if job titles were adjusted upward as well. For, as mentioned earlier, a lot of the perceived quantum leap of skills and ability required in the office of the future breaks down under closer observation to something more akin to attitude than to actuality. For instance, although the company secretary in Case 1 now spends over 50 per cent of her time doing what an executive or research assistant would be doing, her boss still called her a secretary and could not conceive of her moving on to a para-professional or management position. Such a clerical worker by another name, however, might be considered a prime candidate for the courses in data processing or computer programming which, over a year or so, would round out the requirements for some of the professional positions which will be in demand over the next 5 to 15 years.

In conclusion, therefore, I offer the following recommendations.

RECOMMENDATIONS

Recommendation 1: A major public education campaign should be launched to help alert women to what informatics is doing to traditional clerical and administrative work and to encourage industry to take responsibility for retraining and relocating employees in areas of declining demand.

It could be argued in such a campaign that the "social responsibility" of retraining and relocating redundant personnel is as legitimate an aspect of running a business as keeping up with office-automation technology. Unless women are trained for the new information occupations, skill shortages in these areas will be inevitable, and this could jeopardize productivity increases anticipated from the new technology.

Recommendation 2: Existing Manpower training and counselling programs for women should be retailored. Also, alternative training options -- such as on-the-job educational partnerships between government and industry -- should be explored.

The former programs could help women bridge the skills gap between traditional female occupations and the more non-traditional occupations such as computer programming and accounting, thereby preventing the gap from becoming unbridgeable. The latter suggestion, combining learned skills with experience in applying such skills, could help break down attitude barriers associated with informal dual career ladders and with a secretary being trapped in the ghetto of others' perceptions -- both of which were discussed earlier.

Recommendation 3: Occupational bridging mechanisms and affirmative action agreements should be incorporated with all retraining endeavours for a two-pronged program of occupational mobility for women.

It has been argued, fairly convincingly in recent academic studies (3) that structural barriers within the labour market and workplace are a greater impediment to women's occupational mobility than any paucity of personal resources -- such as education -- on their part. It has been found, for instance, that there are fewer opportunities for advancement associated with occupations where women are most heavily concentrated than in traditionally male-dominated occupations. Hence, it is essential to stress the structural ingredients in any mobility program.

Recommendation 4: Special tripartite (industry, labour and government) task forces on employment adjustment and informatics for major industry groups should be created.

Such groups, being small, would allow intimate discussion of concrete examples. The meeting of minds would also help to sensitize each of the three representative delegations to others' perspectives, which would be an invaluable exercise in itself. The task forces would address long-range concerns such as the implications of increased part-time and shift work for benefits and minimum wages, as well as increasing options for educational leave and shorter work weeks.

There are many many concerns -- some requiring wide public debate; some requiring immediate and sensitive

attention. I have attempted to pull some of the more
immediate concerns into focus. These include a shift in
employment away from low-level process and procedure work
into highly skilled and creative work. Industry regards the
difference as the equivalent of a "quantum leap" in skills
and aptitude. Another view would be that skills are
evolving, only at a more rapid rate than usual.

If some boost-up or catch-up programs were implemented
as training and occupational bridging, the second scenario
would likely be proven correct. Without such affirmative
action, however, I fear that the quantum leap scenario will
unfold, with Canada facing a skills shortage plus
unemployment due to occupational discontinuity as redundant
clerical and administrative workers fail to leap a skills gap
that has been left to reach unbridgeable proportions.

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APPENDIX

Equal Employment Opportunities
Program at the Royal Bank

The Equal Employment Opportunities Program at the Royal Bank has institutionalized job mobility into the employment structure, the performance-review process and into employees attitudes.

A major element of this is the Opportunities Program. Anyone joining the bank staff at a pre-management or lower level is expected to complete a form that asks what career aspirations the individual has. To assist personnel in completing this form, the bank has prepared a small book listing and describing every job within the bank and illustrating sequences of positions leading to senior occupations as well as training or education required along the way. A review of the individual's opportunities form is now a standard feature of performance appraisals. As well, it has become bank policy to staff positions only with employees who have completed an opportunities form.

The Equal Employment Opportunities Co-ordinator, a full-time position with fairly senior status, stresses the validity of occupational mobility not ony in sensitivity sessions with middle and senior management, but also by accompanying colleagues on the annual national tour, scouting potential recruits for the management development program. Through a combination of affirmative-action perspectives and the insinuation of additional recruitment criteria which would accomodate experience without the requirement of specific job titles (such as Branch Administration Officer) and educational credentials (such as B. Comm.), she has helped increase the proportion of females among the roughly 400 recruits chosen annually from negligible to nearly half.

One of the perennial difficulties facing women in banks has been their nearly total concentration below the level of Branch Administration Officer (Figure 1) which has

traditionally been the only stepping stone to senior ranks.
Women were normally excluded from the BAO training program
for lack of one or more of the credentials that the men
traditionally had: a B. Comm degree plus formal experience
in accounting, lending and administration. Another
prerequisite which subtley excluded women was the requirement
that the BAO trainee to be willing to be transferred.

Now the criteria for entry into the BAO training program
have been widened to include informal experience in
accounting, administration, etc. As well, the EOW
co-ordinator has gained informal assurances, at least, that
the issue of transfer will be left until a concrete situation
arises, with the employee free to refuse the transfer.

The BAO program, which involves some classroom-type
training and extensive apprenticeship on the job, last from
six months to a year.

Other apprenticeship-type education programs include the
Personal Loans Officer training program, which last six
months and includes three weeks of classroom training.
Finally, there is the Management Development Program which
lasts up to a year, depending on the recruit.